Millipede salvage in south-western Victoria

Robert Mesibov

Queen Victoria Museum and Art Gallery, Launceston, Tasmania 7250. Email: mesibov@southcom.com.au

Abstract
Millipedes and other litter invertebrates were sampled in forest patches scattered over approximately 3000 km^2 of southwest Victorian farmland, mainly between the Eumeralla and Hopkins Rivers. Three new, geographically restricted species of *Somethus* (Polydesmida: Paradoxosomatidae) were collected. Litter fauna in the sampled patches, apart from Framlingham Forest, included few species that are poor dispersers. Absences may be the historical legacy of past habitat fragmentation, subsequent local extinctions and a very low probability of patch recolonisation. (*The Victorian Naturalist* **125** (4), 2008, 96-104)

Introduction

Polydesmida are the most abundant and diverse group of native Australian millipedes (Mesibov 2006-07). Until recently, only 18 species and subspecies of native Polydesmida had been recorded from Victoria (Mesibov 2004a). The author has since described 11 new species (Mesibov 2004a, 2006) and sorted at least 50 more from museum collections.

Among the undescribed new Polydesmida are at least 20 species in the genus *Somethus* Chamberlin, 1920 (Fig. 1), which also occurs in southeast New South Wales, southeast South Australia and northern Tasmania. *Somethus* appears to be particularly diverse in Victoria's western district. This is unfortunate for millipede conservation, as *Somethus* spp. are restricted to woody vegetation (forest, woodland and scrub) and most of the district's pre-European cover of woody vegetation has been cleared.

As part of an ongoing documentation of *Somethus* diversity and distribution, a methodical salvage of millipedes and other litter invertebrates was carried out by the author in a particularly well-cleared portion of the Western District (Fig. 2). Salvage sampling aims to recover specimens and ecological and biogeographical information from severely degraded habitats, or from better-quality habitats likely to be lost in the near future (Mesibov 2004b). Details of the western district study are presented here as possible guides to salvage sampling elsewhere in rural Australia.

Methods

Overview of the study area

The study area boundaries (Fig. 2) are the Glenelg Highway (north), Hopkins River (east), Princes Highway (south) and Eumeralla River and its headwater swamps (west). The eastern and western boundaries are those of the County of Villiers, and the included area is 2830 km^2. Most of the study area is in Moyne Shire and the City of Warrnambool. The north-western portion extends into Southern Grampians Shire.

Most of the study area is flat, with low basalt hills and stony rises in the east and south. Flats in the west are covered in sandy loams and are poorly drained; in presettlement times the west had numerous wetlands. Eight recording stations in and bounding the study area average 706 mm annual rainfall (data from Bureau of Meteorology). Land use is predominantly dairy and sheep grazing. Several thousand hectares of *Eucalyptus globulus* plantations have been established in the west since the late 1990s. For further information on soils, climate, current vegetation and modelled pre-1750 Ecological Vegetation Classes, see the summaries for the study area's two Victorian bioregions, Warrnambool Plain and Victorian Volcanic Plain (www.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/biodiversity_bioregions_vic).

Early accounts and local histories of the southern and eastern portions of the study area describe a heavily timbered landscape (Bennett 1984; Sayers 1972; Yambuk Book Committee 1994). *Eucalyptus viminalis* and *E. obliqua* dominated over

Fig. 1. *Somethus* n. sp. 'Big River'. Most *Somethus* spp. are light to dark brown and 25-30 mm long as adults. Species are distinguished by the structure of the male genitalia.

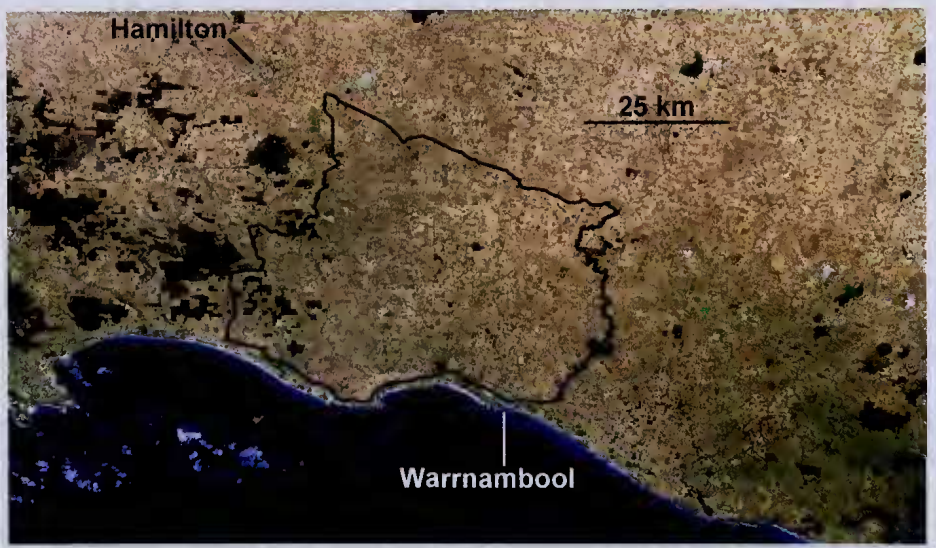

Fig. 2. Study area (black outline) in southwest Victoria. 2004 Landsat image, geographic projection (National Carbon Accounting Toolbox and Data Viewer, version 2.0, Australian Greenhouse Office).

Acacia melanoxylon, Allocasuarina stricta and *Exocarpos cupressiformis*. Most of the forest and woodland in the study area had been cleared before 1900; some of the swampy forest north of Yambuk and east of Bessiebelle was cleared and drained after the second world war.

Selection of sampling locations

Digitised aerial photos of the study area taken in 1947-1950 (Department of Sustainability and Environment 2006) were georegistered into GIS using junctions and bends in the digitised Victorian road network as reference points. Polygons were then hand-digitised around all patches of forest, woodland and scrub

greater than 1 ha on the aerial photos; linear (probably planted) windbreaks were excluded. The resulting GIS layer, '1950 patches', comprised all native woody remnants in the study area approximately 60 years ago, and totalled 62 km^2. (This layer and those described below were projected into the Universal Transverse Mercator system for area measurements.)

A GIS grid layer, showing presence/absence of forest in the study area in 2005 Landsat imagery (National Carbon Accounting Scheme, Australian Greenhouse Office) as filled/unfilled 0.9 degree (25 m) cells, was converted to a polygon layer. 'Forest' is defined by the NCAS as vegetation with a minimum 20% canopy cover, potentially reaching 2 m high with a minimum area of 0.2 ha. Polygons smaller than 625 m^2 (NCAS grid resolution) were deleted. The edited layer, '2005 patches', totalled 105 km^2 and comprised remnant vegetation, windbreaks, gardens and forest plantations in the study area, as of 2005.

The spatial intersection of '1950 patches' and '2005 patches' is a third polygon layer, here called 'persistents'. It includes patches of native woody vegetation which had persisted in the landscape for nearly 60 years and were therefore priority sites for sampling. The 'persistents' layer, initially totalling 26 km^2, was transferred to paper maps for use in the field after editing. 2004 Landsat imagery (National Carbon Accounting Toolbox and Data Viewer, version 2.0, Australian Greenhouse Office) was used to delete some plantation blocks. Additional 'persistents' patches were culled later when ground truthing showed them to be plantations or small groups of senescent eucalypts in pasture.

The final set of 18 'persistents' patches and patch clusters, totalling 14 km^2, is listed in Table 1 and shown in Fig. 3. There was insufficient time available during fieldwork to inspect two 'persistents' patches totalling 55 ha on private land west of Orford, between Pallisters and Codrington-Bessiebelle Roads. Both patches are shown as non-plantation forest in the online mapper 'Forest Explorer Online' (Department of Sustainability and Environment, http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site=forestexplorer, accessed 15 October 2007).

Within the study area millipedes were looked for also in roadside strips of native woody vegetation, in *Eucalyptus globulus* plantations close to native forest, and in the planted native vegetation of the Tower Hill State Game Reserve. Just west of the study area Big River State Forest, Mt Eccles National Park and Mt Napier State Park were visited. East of the study area the Ralph Illidge Sanctuary at Naringal East was sampled.

Publicity and landowner contacts

Thirteen of the 18 targeted locations in Table 1 were on private land. Before fieldwork began, Moyne Shire Council distributed a letter regarding the study to owners of land carrying or adjoining 'persistents' patches. The letter provided details about the author and the proposed study, and included close-up photos of a Portugese millipede and a *Somethus* sp. The *Hamilton Spectator* newspaper published the photos and a brief article about the work. Contact was made also with Trust for Nature, the Warrnambool Field Naturalists Club, the Aboriginal owners of Framlingham Forest, the South West Integrated Flora and Fauna Team (http://www.swifft.net.au), the Glenelg-Hopkins Catchment Management Authority, and forestry companies with plantations in and around the study area. All landowners contacted in the study area, including plantation companies, granted free access to their properties to sample millipedes, and several landowners were generous in providing historical and other information.

Millipede sampling

Searches by day for millipedes (and associated litter invertebrates) were made in and under litter (wood, bark and leaves); under loose bark on trees; under stones; and in moist soil under small accumulations of rotting vegetation. The search effort was guided by the author's experience as a millipede collector. The aim was to find and collect as many specimens as possible in the time available by the most efficient method, ie. searching (Mesibov *et al.* 1995, Snyder *et al.* 2006), rather than to compare abundance and diversity at different sites.

Sampling in the winter of 2007 followed 'autumn break' rains. Sampling dates were

Table 1. 'Persistent' native forest patches and patch clusters in the study area, in decreasing size order; areas are approximate. Locations given are also approximate; collecting sites within patches were accurately located. Patch numbering as in Fig. 3.

Name	Tenure	Location	Remarks
Visited:			
1. Framlingham Forest	private	38°17'S 142°40'E	1000 ha block of dense regrowth, sparse native understorey. (2 visits)
2. 'The Wickham', Woolsthorpe	private/ public	38°12'S 142°23'E	Formerly private forest, lightly cut and burned; 230 ha in 1950. Now 30 ha private shooting range (north) and 30 ha Woolsthorpe Nature Conservation Reserve (south). Dense regrowth, diverse native understorey in Woolsthorpe NCR. (3 visits)
3. 'Hocking Bush'	private	38°12'S 142°02'E	50 ha of swampy forest, diverse native understorey; 115 ha in 1950. Owned by Trust for Nature. (2 visits)
4. Pallisters Road 1	private	38°14'S 142°01'E	50 ha of mixed-age forest, diverse native understorey; 180 ha in 1950. (1 visit)
5. Pallisters Reserve	private	38°13'S 142°02'E	35 ha of mixed-age forest, formerly grazed, sparse native understorey; 260 ha in 1950. Owned by Trust for Nature. (1 visit)
6. St Helens Flora Reserve	public	38°14'S 142°04'E	35 ha (including small adjoining remnant) of swampy forest with dense, diverse native understorey; formerly part of 250 ha remnant including a Recreation Reserve. (3 visits)
7. Shadys Lane, Mailors Flat	private	38°17'S 142°29'E	25 ha of mixed-age forest, fragmented, with broom and pasture understorey. (1 visit)
8. Russells Road, Mailors Flat	private	38°16'S 142°28'E	Cluster of forest fragments, 7 (1 visit), 5 and 3 ha on separate blocks; sparse, weedy native understorey.
9. Mt Misery Road, Broadwater	private	38°10'S 142°03'E	13 ha of regrowth forest with mainly weedy understorey, grazed; 50 ha in 1950. (Not searched)
10. Terka Road, Kirkstall	private	38°16'S 142°15'E	Cluster of 13 ha of forest fragments, largest 6 ha (1 visit) with bracken patches in pasture grass and weed understorey, grazed; 260 ha in 1950.
11. Moyne	private	38°19'S 142°16'E	Cluster of 12 ha of small forest fragments, the largest 3 ha, with mainly pasture grass understorey; 85 ha in 1950. (Not searched)
12. Orford sports ground	public	38°12'S 142°06'E	10 ha of mixed-age forest with variably weedy understorey. (1 visit)
13. Mt Rouse	public	37°53'S 142°18'E	7 ha of regrowth forest with pasture grass and weed understorey; 25 ha in 1950. (1 visit)
14. Broadwater	private	38°09'S 142°04'E	4 ha of forest with mainly pasture grass understorey, grazed; 70 ha in 1950. (Not searched)
15. Pallisters Road 2	public	38°11'S 142°01'E	4 ha of forest with dense, diverse native understorey; 220 ha in 1950. (2 visits)
16. Donovans Lane, Macarthur	private	38°04'S 142°05'E	Two neighbouring forest fragments, 4 ha, with mainly pasture grass understorey; 180 ha in 1950. (1 visit)
Not visited:			
17. West of Masons Road, Bessiebelle	private	38°12'S 141°59'E	35 ha; 200 ha in 1950.
18. Pallisters Road 3	private	38°14'S 142°00'E	20 ha; 250 ha in 1950.

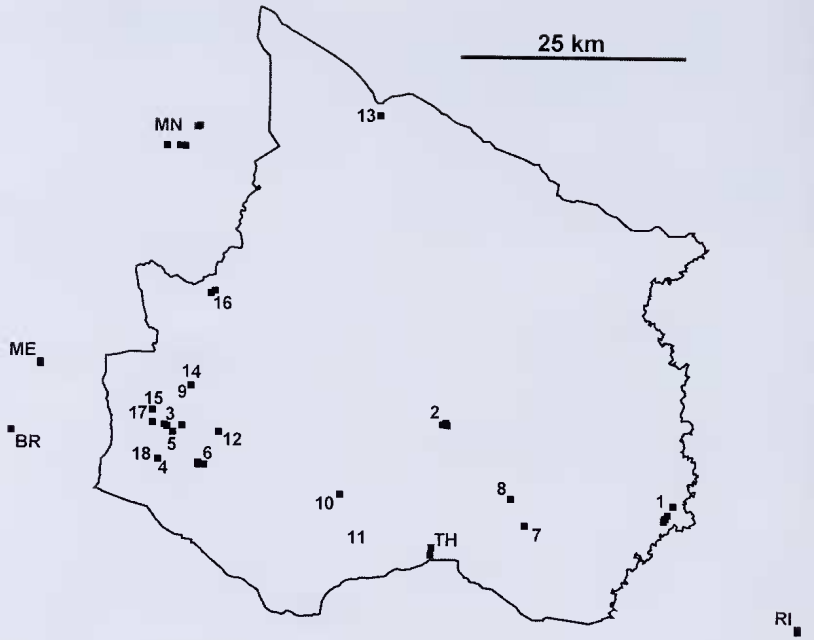

Fig. 3. Collecting sites (squares) and approximate locations of 'persistent' patches (numbers). Patch numbering as in Table 1. BR = Big River State Forest, ME = Mt Eccles National Park, MN = Mt Napier State Park, RI = Ralph Illidge Sanctuary, TH = Tower Hill State Game Reserve. Mercator projection.

26–28 May, 5–9 July and 30 August – 4 September. On those 14 days, searching in and around the study area occupied 10 full-day equivalents. The author's wife, also an experienced millipede collector, assisted on most days. Up to two hours were spent searching at a site, and several sites were repeatedly visited. Search time on-site totalled 38 person-hours in the study area and another 12 person-hours in the near surrounds.

Collection localities were recorded with a hand-held GPS. At several sites where satellite signals were weak, positions were noted in the field and located later using the online mapping resource Google Earth.

Specimens were preserved in 80% ethanol and deposited after study in Museum Victoria.

Results

Overview of patches

Of the 14 km^2 of surviving 'persistents' patches in the study area, the Aboriginal-owned and managed Framlingham Forest block accounted for 10 km^2 and had not been significantly reduced in area since 1950. A diverse and abundant native litter fauna was found in the Forest, despite its long history of light timber harvesting and frequent burning, a scarcity of rotting logs, and an intense wildfire that had burned more than 90% of the Forest in the preceding summer.

The remaining 390 ha of surviving 'persistents' patches had been reduced from 2400 ha since 1950 (Table 1) through conversion to pasture and *E. globulus* plantation. The habitat quality of the 340 ha visited was variable. Healthy forest over a diverse native understorey was found in Woolsthorpe Nature Conservation Reserve, St Helens Flora Reserve and several private blocks west of Orford (Table 1). Most other patches had a sparse, weedy understorey and showed signs of recent grazing.

Sampling results

Three new species of *Somethus* were sorted from highly disjunct localities in the study area and its near surrounds. All three *Somethus* spp. were found mainly in thin (1-2 cm deep) layers of leaf litter or richly organic topsoil in the shade of *Eucalyptus*

or *Acacia*. *Somethus* n. sp. 'Big River' was collected in Big River State Forest, 10 km west of the study area. *Somethus* n. sp. 'Orford' was found in St Helens Flora Reserve, 20 km east of Big River State Forest. *Somethus* n. sp. 'Kikkabush' was collected in Framlingham Forest, 50 km east of St Helens Flora Reserve. In 2006, two specimens of *Somethus* n. sp. 'Kikkabush' had been found at a house in Ralph Illidge Sanctuary, 20 km southeast of Framlingham Forest, by the resident caretaker.

A fourth species of paradoxosomatid Polydesmida, here code-named 'V141-1-1' was also found in Framlingham Forest and Ralph Illidge Sanctuary. This species had previously been recorded near Nelson, Victoria (Museum Victoria lot K-10302), close to the coast and the South Australian border, and thus has a linear range of at least 160 km.

Two other native millipede species were collected in the study area, both in order Polyzoniida. Siphonotid sp. 1 was abundant in both Framlingham Forest and Woolsthorpe Nature Conservation Reserve, while Siphonotid sp. 2 was found only in Framlingham Forest.

The only other millipede seen in the study area was the introduced *Ommatoiulus moreleti* (Lucas, 1860) (Julida: Julidae), commonly known as the Portugese millipede. *O. moreleti* is very abundant in gardens, weedy bushland and coastal scrub around Port Fairy and Warrnambool. It is also very abundant in the planted bushland of the Tower Hill State Game Reserve, on Mt Rouse at Penshurst, and in some of the wooded roadside strips in southern Moyne Shire.

In most of the patches visited abundant native arthropods were found from groups with widely dispersing life stages, e.g. ants, termites, cockroaches, tenebrionid beetles and spiders. The introduced woodlouse *Porcellio scaber* Latreille, 1804 and the introduced snails *Arion intermedius* Normand, 1852, *Deroceras* spp. and/or *Oxychilus* spp. were present at several of the sites with pasture grass and weedy ground layers. The sampling also yielded a small by-catch of native velvet worms (one sp.) and native land snails (seven spp.), as well as unidentified carabid beetles and geophilomorph and cryptopid scolopendromorph centipedes.

Discussion

Millipede salvage

Polydesmida were found at only two of the 16 locations visited in the study area: Framlingham Forest and St Helens Flora Reserve. It is possible that Polydesmida were present in very low numbers in the larger of the other 14 patches visited, or were restricted to unsearched places within those patches, or both. Although eight person-hours were spent searching in the 35 ha St Helens Flora Reserve, only nine adult specimens of *Somethus* n. sp. 'Orford' were taken, from two spots 50 m apart.

Nevertheless, it was suspected that Polydesmida were genuinely absent from most of the patches visited. Three explanations for contemporary absence might be considered. The simplest is that Polydesmida were also largely absent from forests and woodlands in the study area in pre-European times. This is a doubtful proposition, as Polydesmida (notably *Somethus* spp.) have been collected by the author in little-disturbed forest, woodland and woody scrub elsewhere in south-western Victoria in recent years, as well as by other collectors (specimens examined by the author in Museum Victoria).

A second possibility is that past habitat fragmentation reduced patch size to the point where millipede populations were too small to be self-sustaining in the face of natural disasters such as drought, intense fires, disease and intense predation pressure. Surrounding barriers of pasture would have made recolonisation from larger, nearby forest patches impossible.

A third possibility adds another class of disturbance, namely intense grazing by sheep and (before the 1950s) rabbits. Both species are known to have reduced some Australian woodlands to 'trees over dust' during droughts. In this view, the apparent suitability of some of today's remnant forest patches as millipede habitat is misleading. There may have been periods in post-settlement western Victoria when components of the local litter fauna were wiped out in remnants on or adjoining farms. The vegetation may have since recovered, but not the fauna.

This 'recovery' scenario has been proposed for remnant vegetation in farmed landscapes elsewhere in south-eastern Australia (Lunt and Spooner 2005). However, it needs support from high-quality documentation that is unavailable for the study area, such as ground-level photography of particular forest patches in the period 1850-1950. The only evidence known to the author is oral testimony from a farmer he met south of Mt Napier, just outside the study area. Very few litter invertebrates (and no millipedes) were found in dense eucalypt regrowth with a sparse wattle understorey along Harmans Road. The farmer had known the area for more than 60 years, and said that prior to the introduction of myxomatosis in the 1950s, rabbit and stock browsing had prevented tree regeneration. At the time, the Harmans Road area carried only scattered old eucalypts over frequently burned grassland. When the rabbit population declined, eucalypt regeneration succeeded, and with the gradual 'thickening' of the vegetation, wattles established where protected from browsing. In agreement with this account, 1948 aerial photography of Harmans Road (Department of Sustainability and Environment 2006) shows woodland with large-crowned trees, not dense forest. Similar accounts of post-rabbit vegetation 'thickening' are referenced in Lunt and Spooner (2005): 'Before this regeneration pulse, the vegetation structure in most remnants would have been extremely simple (mature trees above a heavily denuded understorey), as rabbits precluded recruitment of most species' (p. 1864).

It is easy to think that natural habitats have been in steady decline since European settlement, and that salvage sampling is needed to document vanishing biodiversity before more clearing, weed invasions and climate change result in local extinctions in future. The situation may not be that simple. Local extinctions may have happened 50 or more years ago in habitats whose 'naturalness' has been increasing ever since. Salvage in such places will be many years too late.

This may be the case for Polydesmida in 'The Wickham' bush west of Woolsthorpe (Table 1). Local historian Ruth Bennett (2002) described it as a remnant of a much larger private forest, and published an early photo of a local family sawing a log there after a bushfire. Her son, zoologist Andrew Bennett, surveyed the mammals of the Woolsthorpe area, and commented that

> when one considers that the original habitat has been transformed from forest to open pasture land, and from native vegetation to introduced pasture grasses and trees, together with the invasion and spread of introduced mammals and the introduction of huge numbers of domestic stock, it is surprising that any native mammals remain at all! (Bennett 1982:239).

The history of St Helens Flora Reserve is similar to that of other high-quality remnants in south-east Australia (Lunt and Spooner 2005), in that the large block of land which formerly included the Reserve was first surveyed as a community reserve. Until the late 1930s the 'Race Course and Recreation Purposes' reserve was the site of the Yambuk Picnic Races, and an article in the *Port Fairy Gazette* for 27 February 1939 referred to 'The picturesque St Helens racecourse, fringed with its belt of trees...' The racetrack is still clearly visible in 1950 aerial photography (Department of Sustainability and Environment 2006); its southern portion loops through today's Flora Reserve. Since the 1970s the Reserve has been informally managed by the adjoining landowner. Arguing that the resident population of bandicoots will be exposed to increased fox predation if the Reserve is burned, the landowner has successfully excluded fire from the Reserve for many years, with the result that leaf and bark litter has rotted into richly organic topsoil in many places.

Millipede conservation

Conserving patches of native forest, woodland and woody scrub in Victoria is a practical means of conserving native millipedes and other poorly dispersing litter invertebrates, but only if those invertebrates are still present on site. While restoration of degraded patches in the Western District is of value in conserving readily dispersing vertebrates and invertebrates, it will not bring back locally extinct populations of forest-dwelling species which cannot recolonise such patches across kilometres of grassland.

Species-by-species conservation of cryptic invertebrates such as millipedes is also problematic, although possible (Mesibov 2007). Of the three new and geographically restricted *Somethus* spp. discovered in this study, two (n. spp. 'Big River' and 'Kikkabush') are known to occur in large blocks of native forests in good condition. *Somethus* n. sp. 'Orford' may be present at low density in private forest blocks west and north of its only currently known locality, St Helens Flora Reserve. Informal management of this Reserve (see above) has probably benefited litter fauna. If the Reserve were to be regularly burned in future, it could well become weedier and more suited to the Portugese millipede *O. moreleti*, a likely competitor of *Somethus*.

In roadside conservation strips, *Ommatoiulus moreleti* was found but no native millipedes. Although many of these strips in Moyne Shire carry old-growth eucalypts, their ground layers typically consist of pasture grass and weeds.

It is interesting also that no millipedes were found in the study area in *E. globulus* plantations whose edges closely paralleled (separation 20 m or less) an adjacent block of native forest. Native millipedes are known to thrive in forest plantations in Australia (Elliott 1971, Bonham *et al.* 2002, Mesibov 2005), particularly under *Pinus radiata*, and a dense population of *Somethus scopiferus* Jeekel, 2002 was found in pines in Rennick State Forest, 90 km west of the study area, in the 2007 winter. Native millipedes also occur in Tasmanian plantations of *Eucalyptus nitens* (Bonham *et al.* 2002) and *E. globulus* (pers. obs.). Millipedes may be absent from local *E. globulus* stands because there are no source populations in adjoining native vegetation, or because not enough time has passed for successful colonisation. Most of the study area plantations were established after 2000.

Acknowledgements

I am grateful to the landowners who allowed me access to their properties for millipede sampling; to Shirley Duffield (Ralph Illidge Sanctuary) for millipede specimens; to Andrew Bennett (Deakin University), Len Clarke (Kikkabush Aboriginal Pastoral and Advancement Association, Framlingham) and David and Sue Rowbottom (St Helens) for advice on site history; to Moyne Shire Council staff for publicity and administrative assistance; to *The Hamilton Spectator* newspaper for friendly publicity; to the Australian Greenhouse Office and the Department of Sustainability and Environment, Victoria for spatial data; and to Kevin Bonham (Hobart) for snail identifications and distribution information. I thank my wife, Trina Moule, for her patient assistance in the field. This study was funded by the author.

References

Bennett AF (1982) The mammals of the Woolsthorpe area, western Victoria: and the changes that have occurred since European settlement. *The Victorian Naturalist* **99**, 229-240.

Bennett, R. (1984) *Richard Bennett's Early Days of Port Fairy*. (Warrnambool Institute Press: Warrnambool)

Bennett R. (2002) *Glimpses into the Past. A History of Woolsthorpe*. (Bennett Family: Warrnambool)

Bonham KJ, Mesibov R and Bashford R (2002) Diversity and abundance of ground-dwelling invertebrates in plantation *vs.* native forests in Tasmania, Australia. *Forest Ecology and Management* **158**, 237-247.

Department of Sustainability and Environment (2006) *Victorian Aerial Photo Mosaics 1930-1940's, vols. 1 and 2* [on CD-ROM]. (Department of Sustainability and Environment: Melbourne)

Elliott H (1971) The role of millipedes in the decomposition of *Pinus radiata* litter in the Australian Capital Territory. *Australian Forest Research* **4**, 3-10.

Lunt ID and Spooner PG (2005) Using historical ecology to understand patterns of biodiversity in fragmented agricultural landscapes. *Journal of Biogeography* **32**, 1859-1873.

Mesibov R (2004a) A new genus of millipedes (Diplopoda: Polydesmida: Dalodesmidae) from wet forests in southern Victoria, with brief remarks on the Victorian Polydesmida. *Memoirs of Museum Victoria* **61**, 41-45.

Mesibov R. (2004b) Spare a thought for the losers. *Australian Zoologist* **32**, 505-507.

Mesibov R (2005) Native species dominate the millipede fauna in a second-rotation *Pinus radiata* plantation in Tasmania, Australia. *Pacific Conservation Biology* **11**,17-22.

Mesibov R (2006-07) *Millipedes of Australia*. www.qvmag.tas.gov.au/zoology/millipedes/index.html, accessed 1 October 2007.

Mesibov R (2006) The millipede genus *Lissodesmus* Chamberlin, 1920 (Diplopoda: Polydesmida: Dalodesmidae) from Tasmania and Victoria, with descriptions of a new genus and 24 new species. *Memoirs of Museum Victoria* **62**, 103-146.

Mesibov R (2007) The Trafalgar millipede *Lissodesmus johnsi* Mesibov, 2006. *The Victorian Naturalist* 124, 197-203.

Mesibov R, Taylor RJ and Brereton RN (1995) Relative efficiency of pitfall trapping and hand-collecting from plots for sampling of millipedes. *Biodiversity and Conservation* **4**, 429-439.

Sayers, CE (1972) *Of Many Things: A History of Warrnambool Shire*. (Olinda Books: Olinda)

Snyder BA, Draney ML and Sierwald P (2006) Development of an optimal sampling protocol for millipedes (Diplopoda). *Journal of Insect Conservation* **10**, 277-288.

Yambuk Book Committee (1994) *Yambuk and district 1839-1994, a local history compiled by local residents*. (Yambuk Book Committee: Warrnambool)

Received 25 October 2007; accepted 28 February 2008